

CLAIMS

1. A method of managing information exchanges in a worksite (20), by
5 networking items of apparatus (4, 16, 24, 26, 30, 28, 34) which perform tasks in
connection with said worksite and which receive and/or send data, the method
using an electronic data network (32, 68, 72) comprising management means (74,
76, 66, 64) cooperating with a plurality of communications interfaces (42-46), a
given said item of apparatus having a data link with a specified said
10 communications interface,
characterised in that:
- at least some said items of apparatus (4, 16, 24, 26, 30, 28, 34) are organized in
hierarchical levels according to a determined dependency relationship of the
worksite, and in that
15 said management means (74, 76, 66, 64):
- stores a correspondence between each said item of apparatus organized in
hierarchical levels and an address structure reflecting the hierarchical position of
that item of apparatus in said determined dependency relationship of the worksite,
and
20 - uses that correspondence to establish a communications link with a selected item
of apparatus, via its communications interface, in response to a call addressed with
an address structure reflecting the hierarchical position of said selected item of
apparatus.
- 25 2. Method according to claim 1, comprising the step of accessing from
outside said worksite (20) a selected said item of apparatus (4, 16, 24, 26, 30, 28,
34) through said electronic data network (32, 68, 72) by using an address
comprising said address structure reflecting the hierarchical position of said
selected item of apparatus.
- 30 3. Method according to claim 1 or 2, wherein said management means (74,
76, 66, 64) operate by converting said address structure reflecting the hierarchical
position of said selected item of apparatus (4, 16, 24, 26, 30, 28, 34) into a
corresponding device address for accessing said selected item of apparatus on said
35 electronic network, for example the IP (Internet Protocol) address, and by using

that device address to call the communications interface to which said selected item of apparatus has a data link.

4. Method according to any one of claims 1 to 3, wherein said address
5 structure reflecting the hierarchical position of said selected item of apparatus (4, 16, 24, 26, 30, 28, 34) is expressed as a directory-path.

5. Method according to any one of claims 1 to 4, wherein said worksite (20)
is identified by a generic portion of a said address that comprises said address
10 structure reflecting the hierarchical position of a selected item of apparatus (4, 16, 24, 26, 30, 28, 34).

6. Method according to any one of claims 1 to 5, wherein said address
structure reflecting a hierarchical position of a said item of apparatus (4, 16, 24,
15 26, 30, 28, 34) is a Uniform Resource Locator (URL), said URL having a
directory-path portion corresponding to said address structure reflecting the
hierarchical position of said selected item of apparatus.

7. Method according to claim 6, wherein said uniform resource locator has a
20 hostname portion that is specific to said worksite (20).

8. Method according to any one of claims 1 to 7, wherein said worksite (20)
is an outdoor worksite comprising any one of:

- i) a civil engineering worksite,
- 25 ii) a landscaping worksite,
- iii) a road or rail link construction worksite,
- iv) a mining worksite, e.g. an open-cast mine.

9. Method according to any one of claims 1 to 8, further comprising a step of
30 converting an address structure designating an item of apparatus (4, 16, 24, 26, 30, 28, 34) to be accessed in accordance with a second hierarchy, different from the
hierarchy used by the management means to organize the hierarchical levels
according to said determined dependency relationship, into the address in said
electronic network (20) of said designated item of apparatus.

10. Method according to any one of claims 1 to 9, further comprising assigning a separate class/sub-class, in said hierarchical position relation, to items of apparatus (4, 16, 24, 26, 30, 28, 34) as a function of whether they are static or mobile on the worksite (20).
- 5 11. Method according to claim 10, wherein at least some items of mobile apparatus (24, 98) are given the additional function of relaying messages over said electronic network (32, 68, 72).
- 10 12. Method according to any one of claims 10 or 11, further comprising a step of determining a current position of items of mobile apparatus (24, 98) and managing the distribution of messages within said electronic network (32, 68, 72) accordingly.
- 15 13. Method according to any one of claims 1 to 12, wherein a first level class/sub-class of item of apparatus, in said hierarchical position relation, comprises mobile units (24, 98), a second level of sub-class being at least one command responsive functionally within a said mobile unit.
- 20 14. Method according to any one of claims 1 to 13, further comprising a step of securing communications by providing technical means for restricting access to the network to only authorized communications interfaces.
- 25 15. Method according to any one of claims 1 to 14, further comprising a step of limiting data transmissions to between only those items of apparatus (4, 16, 24, 26, 30, 28, 34) which are mutually compatible or expected to communicate with each other over said electronic network (32, 68, 72).
- 30 16. Method according to any one of claims 1 to 15, further comprising the step of providing a centralized monitoring and/or management of messages exchanged over said electronic network (32, 68, 72).
- 35 17. Method according to any one of claims 1 to 16, further comprising a step of providing a centralized management of static or dynamic identification allocation to the communications interfaces operating in the network (32, 68, 72).

18. Method according to any one of claims 1 to 17, further comprising the step of executing automatically a work plan programming said tasks of said items of apparatus automatically to conduct operations in said worksite, commands of said
5 work plan designating selectively to said items of apparatus (4, 16, 24, 26, 30, 28, 34) using said address structure reflecting the hierarchical position of said selected item(s) of apparatus.

19. Method according to any one of claims 1 to 18, wherein said items of
10 apparatus (4, 16, 24, 26, 30, 28, 34) communicate to each other selectively, a call being made from one item of apparatus to another using said address structure reflecting the hierarchical position of said selected item of apparatus.

20. Use of the method according to any one of claims 1 to 17 for managing an
15 automated worksite in which commands are sent to contour changing apparatus (24) and to on-board apparatus through the defined protocol, the commands being elaborated from a predetermined model.

21. Use of the method according to any one of claims 1 to 18 for managing an
20 automated worksite (20) in which physical and logical addressing of the communications interfaces is separated with a unique ID other than the IP address i.e. permitting multiple/different IP and/or unique ID addressing.

22. A system for managing information exchanges in a worksite (20),
25 comprising an electronic communications network (32, 68, 72) connecting items of apparatus (4, 16, 24, 26, 30, 28, 34) which perform tasks in connection with said worksite and which receive and/or send data, the electronic data network comprising management means (74, 76, 66, 64) cooperating with a plurality of communications interfaces (42-46), a given said item of apparatus having a data
30 link with a specified said communications interface,
characterised in that:

- at least some said items of apparatus (4, 16, 24, 26, 30, 28, 34) are organized in hierarchical levels according to a determined dependency relationship of the worksite (20), and in that:
35 said management means (74, 76, 66, 64) comprise:

- means for storing a correspondence between each said item of apparatus (4, 16, 24, 26, 30, 28, 34) organized in hierarchical levels and an address structure reflecting the hierarchical position of that item of apparatus in said determined dependency relationship of the worksite, and
- 5 - means operating on the basis of said correspondence to establish a communications link with a selected item of apparatus, via its communications interface, in response to a call addressed with an address structure reflecting the hierarchical position of said selected item of apparatus.
- 10 23. System according to claim 22, comprising a terminal outside said worksite (20), operative to access a selected said item of apparatus through said electronic data network, said terminal having means for generating an address comprising said address structure reflecting the hierarchical position of said selected item of apparatus (4, 16, 24, 26, 30, 28, 34).
- 15 24. System according to claim 22 or 23, wherein said management means (74, 76, 66, 64) comprise means for converting said address structure reflecting the hierarchical position of said selected item of apparatus into a corresponding device address for accessing said selected item of apparatus (4, 16, 24, 26, 30, 28, 34) on
- 20 said electronic network (32, 68, 72), for example the IP (Internet Protocol) address, and means using that device address to call the communications interface to which said selected item of apparatus has a data link.
- 25 25. System according to any one of claims 22 to 24, wherein said address structure reflecting the hierarchical position of said selected item of apparatus (4, 16, 24, 26, 30, 28, 34) is expressed as a directory-path.
- 30 26. System according to any one of claims 22 to 25, wherein said worksite (20) is identified by a generic portion of a said address that comprises said address structure reflecting the hierarchical position of a selected item of apparatus (4, 16, 24, 26, 30, 28, 34).
- 35 27. System according to any one of claims 22 to 26, wherein said address structure reflecting a hierarchical position of a said item of apparatus (4, 16, 24, 26, 30, 28, 34) is a Uniform Resource Locator (URL), said URL having a

directory-path portion corresponding to said address structure reflecting the hierarchical position of said selected item of apparatus.

28. System according to claim 27, wherein said uniform resource locator has a
5 hostname portion that is specific to said worksite (20).